Space Weather Forecast

Issued on Saturday, 08 October 2022 at 01:28 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Ongoing chance of Moderate flares, primarily from large sunspots in centre Earth disc.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate with one long period moderate flare observed the smaller of the two regions in the north-centre disc. This is a relatively small and simple bipolar region but with some instability, likely in part due to its slightly angled magnetic field. Some common class flares have also been observed from the larger region in the north centre disc. This is the largest region on the disc. Despite being the largest region on the disc, and with some magnetic complexity due to its twisted magnetic field, this has remained relatively stable. Overall there are seven numbered sunspot regions, however the other regions are generally smaller and simpler.

There are number of filaments, which are lines of plasma held up by the Sun's magnetic field, and one of these was observed erupting at around 0730 UTC. The resultant CME (coronal mass ejection) has been assessed as likely missing, passing just ahead and north of Earth but with a very slow chance of peripheral influences late on day 4 (11th). No other Earth-directed CMEs were observed.

Solar Wind / Geomagnetic Activity: The solar wind remained indicative of Earth being within the fast wind from recent coronal holes, but potentially with peripheral CME influences. Observed winds were low confidence due to instrumentation differences, but slightly elevated winds of around 450-500km/s, likely became enhanced around the middle of the day, peaking 520-580 km/s, Very little notable change was observed in the magnetic field, which remained weak. The north-south component remained variable until shortly after midday when it became predominately positive (northward). Geomagnetic activity eased from initially Active to be Quiet to Unsettled from 07/0900 UTC (Kp 0-4)

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) remained at background with no radiation storms occurring.

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity carries a now reduced chance of reaching moderate, with the main risk predominately attributed to the largest sunspot. No significant regions leave the Sun in the period, and one forecast arrival later in the UTC weekend has yet to present for analysis, leading to a flat risk trend throughout.

Solar Wind / Geomagnetic Activity: There are no Earth-directed CMEs in the forecast, however a CME that misses the Earth on the 11th may give some peripheral influences. This is due to the filament eruption observed on the 7th. Otherwise, current elevated solar winds are expected to perhaps ease day 1 (8th) for a time, before a further enhancement is possible from a coronal hole fast wind arrival later day 1 or day 2 (8th or 9th). This is low confidence, due to the coronal hole being small in size and being new on this rotation. Any enhancement is then likely to ease by day 4 (11th). Quiet to Unsettled geomagnetic activity is expected at first, with a

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chance of rising to Active, and a slight chance of G1/Minor Storms late day 1 and day 2 (7th and 8th) from any fast wind arrival. Easing back to Quiet to Unsettled day 3 and 4, (9th and 10th) with a slight chance of Active.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is expected to remain at background with no radiation storms occurring. However there is a chance of this rising in response to any notable flares from either of the large sunspots on the disc, perhaps approaching the S1/Minor Radiation Storm level.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	20	1	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	50	40	40	40
Very Active	R3 to R5 X	No	10	10	10	10

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Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	**≥ S1**	No	10	10	10	10
Very Active	**≥ S3 ***	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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